

## Weatherization Program Notice 01-4

Effective Date - December 5, 2000

### **SUBJECT: REVISED ENERGY AUDIT APPROVAL PROCEDURES**

**PURPOSE:** To establish energy audit approval criteria used by DOE to determine compliance with rule 10 CFR Part 440 and to establish procedures by which states can submit energy audits to DOE for approval. To establish approval criteria and submittal procedures for revalidating energy audits, priority lists, and lists of general heat waste reduction measures every five years.

**SCOPE:** The provisions of this guidance apply to all grantees applying for financial assistance under the Department of Energy Weatherization Assistance Program.

**BACKGROUND:** Title IV, Energy Conservation and Production Act (the Act) as amended authorizes the Department of Energy to administer the Low-Income Weatherization Assistance Program. All grant awards made under this program shall comply with applicable law, including regulations contained in 10 CFR Part 440, and other procedures applicable to this regulation as DOE may from time to time prescribe for the administration of financial assistance.

The State Energy Efficiency Programs Improvement Act of 1990 (SEEPIA) mandated that DOE, upon application, grant states a waiver from the 40-percent materials requirement, provided that those states comply with certain program requirements. The regulations published March 4, 1993, 10 CFR Part 440, defined these program requirements ('440.21 Standards and techniques for weatherization) as energy audit procedures that were more rigorous than those previously required by the program. The amended rule published June 5, 1995, revised the allocation formula, but did not alter the waiver audit requirements.

The interim final rule published in December 2000 eliminated the base energy audit criteria and made the waiver audit criteria the minimum criteria for an energy audit used in the Program. Accordingly, the 40-percent material cost requirement and the waiver provisions have become unnecessary and have been eliminated from the statute. Other editorial and procedural changes were made to Section 440.21 to clarify the requirements and make review and revalidation processes more straightforward.

Grantees must submit to DOE for approval the energy audit procedures to be used for single family homes, which includes buildings containing up to four dwelling units. Separate energy audit procedures specifically tailored to multi-family dwellings and mobile homes must be approved by DOE if either of these building types represent 20 percent or more of the total units weatherized each year by a grantee's program. Grantees are still encouraged to submit their multi-family and mobile home energy audit procedures to DOE for approval even if the building type accounts for less than 20 percent of the total units served. If multi-family dwelling units or mobile homes represent less than 20 percent of the total units served and grantees choose not to seek DOE approval for the energy audit procedures used on these units, grantees shall describe, in their state plans and in their single-family energy audit request, the approach that will be taken

to ensure that the eligible occupants of multi-family dwellings and mobile homes receive appropriate, cost-effective weatherization services.

This Weatherization Program Notice (WPN 01-4) describes what information the state must submit and establishes the evaluation criteria DOE will use to approve energy audit procedures for the Weatherization Assistance Program. WPN 01-4 supersedes WPN 93-8 and WPN 99-5.

**PROCEDURES:** The Regional Offices shall provide grantees with the energy audit submittal requirements shown in Attachment 1. Grantees will submit the required energy audit information to their DOE Regional Office. The Regional Offices will inspect the submittal to ensure that all the information required for an adequate review is included before forwarding to DOE Headquarters.

DOE Headquarters will review the audit procedures for compliance with the regulations based on a two-tier approval process. The first tier consists of an expedited review process and the second is a more deliberative review requiring back and forth communication between DOE Headquarters, the Regional Office, and the grantee. The first tier is a fast-track review where the application will be processed within 60 days of receipt by DOE Headquarters. If the submittal package contains all the information required and the energy audit procedures fulfill the review requirements, it will be approved and will require no further review for a five-year period.

If the audit submittal package is lacking sufficient information for an adequate review or the audit procedures are not in compliance with the regulations, the audit will receive further review under the second tier of the approval process. The approval criteria for the second-tier review are identical to those for the first tier. The second-tier review will be handled primarily on a case-by-case basis. DOE Regional Offices and Headquarters will work with grantees under the second tier to assist them in gaining approval. DOE assistance will begin with the Regional Offices informing the grantees specifically what is required to gain audit approval.

It is anticipated that many states will want to use the National Energy Audit (NEAT), the Mobile Home Energy Audit (MHEA), or the Energy Audit using the Queens Information Package (EA-QUIP). DOE sponsored the development of NEAT and MHEA and is satisfied that their energy estimating methodology is reasonable. DOE also reviewed EA-QUIP closely before relying on this tool to address multifamily dwelling units.

Therefore, states requesting DOE approval to use NEAT, MHEA, and/or EA-QUIP are not required to submit a description of the energy estimating methodology, measure interaction, or cost-effectiveness requirements that are listed in Attachment 1. However, DOE reviews not only how the energy audit software or manual methods estimate energy use and potential weatherization savings, but also how a state implements their energy audit procedures. Therefore, states requesting approval to use NEAT, MHEA, or EA-QUIP still have to list the measures that are typically enabled and provide the input data, assumptions, and audit results (recommended measures) for two sample dwelling units typical of those weatherized by the state's program. All of the information on field procedures and administrative requirements described in Attachment 1 also must be provided with NEAT, MHEA, and EA-QUIP requests.

Some states may want to use audits developed by other states or commercially available energy audit software. States are reminded that, initially, all audits besides NEAT, MHEA, and EAQUIP require a full submittal for DOE approval. As other energy audits are approved, DOE will periodically issue a list of all approved energy audits that carry the same reduced submittal requirements as NEAT, MHEA, and EA-QUIP.

For the first time, DOE will allow software developers to submit their energy audit software to DOE for approval of the methodology used to estimate energy use and measure savings, account for measure interaction, and handle measure cost-effectiveness requirements. Again, states that want to use these partially approved audits must still submit to DOE the list of measures considered, sample audits, field procedures, and other information as described in Attachment 1.

When necessary, DOE Headquarters will help resolve problems that arise during the audit review process. DOE believes that the majority of problems can be resolved on an informal basis with effective communication.

While the audit approval ensures compliance with the regulations, on-going monitoring is required to ensure that the energy audit procedures continue to recommend cost-effective weatherization measures.

Gail McKinley, Director  
Office of Building Technology Assistance  
Energy Efficiency and Renewable Energy

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## ATTACHMENT 1

### OVERVIEW

Energy audit requirements for the Weatherization Assistance Program are given in the regulations governing the program (10 CFR 440). The energy audit requirements can be grouped into three functional categories: analytic methods, field procedures, and administrative requirements. The specific regulatory requirements that fall under each of the main functional categories are listed in the table below.

Energy Audit Topic	10 CFR 440 Section
<b><u>Analytic Methods</u></b>	
Energy estimating methodology	440.21(e)(1-4), (e)(6)
Measure interaction	440.21 (d)
Cost-effectiveness requirements	440.21 (c)
Measures considered	440.21 (b), (e)(3)
Sample audits	440.21(b), (c), (d), (e)(2-4), (e)(6)
<b><u>Field Procedures</u></b>	

Audit procedures and field protocols	440.21 (e)(1-6)
Measures installed	440.21 (b), (e)(3)
Priority lists	440.21 (f)
General heat waste reduction lists	440.21 (g)
Health and safety	440.21 (e)(5)
<b><u>Administrative Requirements</u></b>	
Energy audit procedures required for each building type served	440.21 (e)(7)
Re-approval every five years	440.21 (h)
Other	Preamble

## DESCRIPTION OF SUBMITTAL REQUIREMENTS

The information that states must submit for each energy audit requirement is described below:

### Analytic Methods

Energy estimating methodology: Describe the methodology used by the energy audit software to estimate annual energy use of the dwelling unit and the potential energy savings from weatherization retrofits. The description should provide sufficient detail for DOE to determine the engineering soundness of the technical approach. The state may provide this description narratively or reference the appropriate section(s) of a users' manual for the energy audit software or other technical support document. Whether described narratively or referenced from another document, the state's response should answer the following questions:

- What energy estimating method is used (e.g., modified degree-day, variable base degree day, ASHRAE bin, ASHRAE modified bin, PRISM)?
- What format of climatic data is used (e.g., degree-day, bin, or hourly data)? If degree-day weather data is used, what base temperature is used and why? Which weather data sites are used for different portions of the state?
- Are existing energy use and energy requirements of the dwelling unit determined from actual energy bills, by generally accepted engineering calculations, or, optionally, both?
- How are conductive, convective, and radiative heat losses (or gains) estimated?
- How does the energy estimating method treat sensible and latent heat gains from internal sources?
- How is the energy consumption of heating and cooling equipment estimated (e.g., steady-state efficiency, part-load curve)?
- Are blower door readings and the results of other tests (e.g., duct leakage) used by the energy estimating method?
- Does the energy audit software address domestic hot water and/or household appliance measures? If so, how is the energy estimated for these end uses?
- As discussed in the cover memo, states requesting DOE approval to use NEAT, MHEA, and EAQUIP are not required to describe the energy estimating methodology. As other

energy audits are approved, a list of audits that have reduced submittal requirements will be periodically issued by DOE.

Measure interaction: States must provide the following information to satisfy this requirement:

- Briefly describe how the energy audit accounts for the interaction between architectural (e.g., insulation, air sealing) and mechanical (e.g., furnace replacement, programmable thermostat) measures.
- Provide audit results of a sample dwelling unit to document that, when moving from an architectural to a mechanical measure (or vice versa), the energy audit procedures adjust the estimated fuel cost savings of measures with lower, non-interacted savings-to-investment ratios (SIRs). The sample audit results should show the interacted and non-interacted energy savings and SIR for at least one architectural or mechanical measure. This will require a recommended measures list that includes at least one architectural and one mechanical measure. If the standard audit reports do not show both interacted and non-interacted energy savings, providing the non-interacted energy savings and SIR may require an additional audit run with just one measure enabled.
- Provide a statement that the energy audit procedures eliminate any measure that has an interaction-adjusted SIR of less than one.

As discussed in the cover memo, states requesting DOE approval to use NEAT, MHEA, and EAQUIP are not required to describe how the audit accounts for the interaction between measures. As other energy audits are approved, a list of audits that have reduced submittal requirements will be periodically issued by DOE.

Cost-effectiveness requirements: Show how SIRs are calculated for individual weatherization measures and for the overall package of measures installed in a dwelling unit. List the costs included in the denominator of individual and overall SIRs.

As discussed in the cover memo, states requesting DOE approval to use NEAT, MHEA, and EAQUIP are not required to show how individual and overall SIRs are calculated. As other energy audits are approved, a list of audits that have reduced submittal requirements will be periodically issued by DOE.

Measures considered: List the weatherization measures that the state typically "enables" for the energy audit to evaluate. Include the material and labor costs for these measures from a typical agency. Provide the expected lifetime of each measure that is used in the SIR calculation.

Sample Audits: Provide the input data, assumptions, and audit results (recommended measures) for two sample dwelling units typical of those weatherized by the state's program. Completed data collection forms, including any auditor notes, should be provided for the sample dwelling units as well as printouts of the data entered into the energy audit software. The recommended measures list should show the measure cost, first-year savings, and SIR for each measure.

Field Procedures

Audit procedures and field protocols: Describe in detail the energy audit procedures used by the state. A copy of the auditor's or field operations manual may be provided to satisfy this requirement. The information provided must be sufficient to answer the following questions:

- How do different audit findings affect the auditor's actions and recommendations?
- What advanced diagnostic and assessment techniques are routinely used by the auditor and/or crew?
- What client education is routinely provided by the auditor? By the installation crew?
- Are the audit and installation procedures specifically tailored for the building type being investigated in light of the varying energy audit requirements of single-family dwellings, multi-family buildings, and mobile homes?

Measures installed: Provide a statement ensuring that only materials that meet or exceed the standards listed in Appendix A and applicable Weatherization Program Notices will be installed in eligible dwelling units.

Priority lists: For similar dwelling units without unusual energy-consuming characteristics, energy audits may be accomplished by using a list of weatherization measures prioritized in order of decreasing SIR. The list, called a priority list, is developed by conducting site-specific energy audits of a representative subset of these dwelling units.

States that want to use a priority list must review their eligible housing stock to determine which building characteristics dictate the selection and order of recommended weatherization measures. As a result of this review, states may find that the list of recommended measures for a typical one-story ranch is different than the list for a one-and-a-half-story Cap Cod house. Energy prices, the heating fuel used, or type of foundation can affect the selection and order of measures on a priority list.

To gain DOE approval, states must describe how the priority list was developed, how the subset of similar homes was determined, and the circumstances that will require site-specific audits rather than the use of the priority lists. States also must provide the input data and list of weatherization measures recommended by the energy audit software or manual methods for several dwelling units from the subset of similar units.

The number of sample audits required to document the priority list depends on how clearly the state defines the set of similar dwelling units on which the priority list will be used. For example, if the state intends to use only two priority lists for all eligible single-family dwellings, 20 sample audits per priority list would be required to ensure that the subset of dwelling units is representative and that the priority list will result in cost-effective weatherization. The variability between buildings in a similar set tends to decrease as the set of dwellings is more and more clearly defined (and the number of sets increases). Thus, if the state chooses to more tightly define the sets of similar single-family houses and request approval for 8 specific priority lists, fewer sample audits are required to document each list.

The following table can be used as a guide to determine the appropriate number of sample audits required to document each priority list for single-family dwellings. DOE will work with states on

a case-by-case basis to determine the appropriate number of sample audits required to document mobile home and multifamily priority lists.

<b>Number of Priority Lists Requested to Represent Single-Family Housing Stock</b>	<b>Number of Sample Audits Required to Document Each Priority List</b>
1	40
2	20
3	12
4	9
5	7
6	5
7	4
8-10	3
11 or more	2

General heat waste reduction lists: States may install in eligible dwellings general heat waste (GHW) reduction weatherization materials that DOE has determined to be generally cost effective without the need for a site-specific energy audit. General heat waste reduction materials are intended to be relatively low-cost items that can be quickly and easily installed. Generally, it costs more to collect data and estimate energy savings from GHW materials than it does to purchase and install them. These DOE-approved, presumptively cost-effective materials include:

- Water heater wrap (i.e., insulating blanket);
- Water heater pipe insulation (on first six feet of hot water pipe exiting water heater);
- Faucet aerators;
- Low-flow showerheads;
- Limited weatherstripping and caulking to increase comfort (does not include major air sealing work, which should be guided by blower door testing); and
- Furnace or air conditioner filters.

States are encouraged to establish procedures to guide the installation of GHW materials and make crews aware of the circumstances that can reduce the cost-effectiveness of these measures.

States may request approval to use GHW materials not listed above by providing documentation of their cost-effectiveness from a representative number of site-specific energy audits or sample energy calculations. DOE will also accept reputable analytic reports or published articles that are generally accepted by the weatherization community to document the cost-effectiveness of potential GHW materials.

Health and safety: DOE will review the health and safety plan located in the master file of a state's grant application. The state should provide a description of how the health and safety plan is implemented in the field. The state may reference the appropriate section(s) of the auditor's or field operations manual to satisfy this requirement.

## Administrative Requirements

Energy audit procedures required for each building type served: Section 440.21(e)(7) requires states to use DOE-approved energy audit procedures that are specifically tailored to each major dwelling type that represents a significant portion of the state's weatherization program. This requirement recognizes the varying energy audit requirements of different dwelling types including single-family dwellings, multi-family buildings, and mobile homes. This Weatherization Program Notice defines "a significant portion of the state's weatherization program" as 20 percent or more of the total units weatherized in the state each year. DOE also encourages states weatherizing multi-family buildings and mobile homes that fall below the 20-percent threshold to adopt energy audit procedures that are designed to select cost-effective measures for these unique building types.

Since its release a few years ago, the Weatherization network has expressed several concerns regarding the Manufactured Home Energy Audit (MHEA). A working group was formed and has recommended changes to address these concerns. Since these changes will take time to implement, states may continue using their existing energy audit procedures to treat manufactured housing (including mobile homes). Program guidance will be issued when the changes to MHEA have been fully implemented and tested. States will have a year after the guidance is issued to transition to MHEA or other mobile home energy audit software and submit an audit approval request to DOE. However, states using manufactured home energy audit procedures other than MHEA are free to submit them to DOE for approval at any time.

For energy audit purposes, DOE considers multi-family buildings to be those containing five dwelling units or more. Approved single-family energy audits can be used in buildings with one to four dwelling units. In the wake of significant funding cuts in 1996, DOE decided to conserve resources by not sponsoring the development of a multi-family energy audit as it had for single family dwellings (NEAT) and mobile homes (MHEA). Instead, DOE chose to rely on an existing audit tool, EA-QUIP, which was the only DOE-approved multi-family energy audit at that time.

EA-QUIP, which stands for Energy Audit using the Queens Information Package, is available from the Association for Energy Affordability, Inc., (AEA) in New York, New York, at no cost to Weatherization agencies. However, AEA charges for training in the use of EA-QUIP and auditing multi-family buildings, and DOE strongly encourages potential EA-QUIP users to receive adequate training. EA-QUIP is currently DOS-based, but can be run from Windows. AEA is working with the New York State Weatherization Program to develop a full Windows version of EA-QUIP.

Re-approval every five years: States must submit their energy audit procedures and priority lists, if applicable, to DOE for re-approval every five years. States must also submit to DOE for re-approval every five years those GHW materials that are in addition to the pre-approved GHW materials listed above, if applicable.

By the beginning of Program Year 2002, all states must submit an initial energy audit approval request for at least a single-family audit. Five years after the initial DOE approval, each audit



that a state is required to use (e.g., single-family, multi-family, and mobile home) must be re-approved by DOE.

If the state has not changed its energy audit procedures, priority list(s), and GHW measures since DOE last approved them (in 2001 or 2002, or later), the information that DOE requires for re-approval is minimal. In this case, the state should submit a letter to DOE explaining that its energy audit procedures, priority list(s), and GHW measures have not changed since DOE last approved them. The letter should specify the name and the version of the energy audit software used by the state. Copies of any existing priority lists and GHW lists (only GHW items in addition to those pre-approved by DOE as listed above) should be attached to the letter.

If the energy audit procedures have changed significantly since DOE last approved them (in 2001 or 2002), the state must submit a full energy audit approval request containing the information described in this notice. A significant change is one that will affect the estimated energy savings of any measure enough to cross the cost-effectiveness threshold (e.g., raise or lower the SIR above or below 1) or change the order of the measures recommended by the audit. Any priority list, if applicable, that has been revised since last approved by DOE must be revalidated by submitting the appropriate documentation as described above.

States are reminded that agencies should update annually the measure costs and fuel prices that the energy audit software or manual methods use to estimate cost-effectiveness. This annual update does not require the audit to be re-approved more often than every five years. However, significant changes in measure costs or fuel prices may affect the selection and order of measures on existing priority lists, which would then have to be re-approved by DOE. DOE will work with states on a case-by basis to minimize the workload required to revise priority lists in these instances.

**Other Administrative Requirements:** If a state adopts an updated version of DOE-approved single-family, multi-family, or mobile home energy audit software, the state should submit to DOE the name and version of the updated software. DOE will contact the software developer to determine what changes have been made. If the energy estimating methods remain essentially unchanged (or have been improved) and the software still complies with program regulations, DOE will approve its use.

Changes to the energy estimating methods may affect the selection or order of measures on priority lists. As a result, priority lists may need to be revised. Again, DOE will work with states on a case-by-case basis to minimize the workload required to revise priority lists in these instances.